National Space Science Data Center/
World Data Center A For Rockets and Satellites

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NSSDC and WDC-A-R&S
Document Availability
and
Distribution Services

October 1983

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National Space Science Data Center (NSSDC)/
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National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland 20771

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INTRODUCTION

Purpose

This publication describes the documents available from the National Space Science Data Center (NSSDC) and the World Data Center A for Rockets and Satellites (WDC-A-R&S), the availability, costs, ordering procedures for documents presently available, and the procedures for obtaining future documents are given.

Background

NSSDC was established by the National Aeronautics and Space Administration (NASA) to further the widest practicable use of reduced data obtained from space science investigations and to provide investigators with an active repository for such data. NSSDC is responsible for the active collection, organization, storage, announcement, retrieval, dissemination, and exchange of data received from satellite experiments. Information on sounding rocket investigations is also collected. In addition, NSSDC collects some correlative data from ground-based observatories and stations for NASA investigators and for on-site use at NSSDC in the analysis and evaluation of space science experiment results. Further information on the activities and operations of NSSDC is included in the information pamphlet, *National Space Science Data Center*, which can be obtained by completing the order form at the end of this document.

WDC-A-R&S is operated in the United States by NASA under the auspices of the Geophysics Research Board of the U.S. National Academy of Sciences. Because of its location contiguous to NSSDC, this WDC-A subcenter can effectively cooperate with NSSDC in obtaining reduced and analyzed data to satisfy requests from scientists outside the United States.

WDC-A-R&S periodically prepares and distributes summaries and reports. The publications contain up-to-date listings of information on rockets and satellites, based on launching reports received during the publication period. The publications are distributed to scientists, institutions, other WDC subcenters, and to the Committee on Space Research (COSPAR). Publications issued by WDC-A-R&S are described later in this document. Information on the history, scope of operation, and services available through this WDC-A subcenter is documented in the information pamphlet, *World Data Center A*. This pamphlet can be obtained by completing the order form at the end of this document.

Document Availability and Ordering Procedures

NSSDC will provide, without charge, single copies of documents identified in this publication or provide automatic distribution services for selected categories of documents upon request from individuals who require the publications for scientific or educational use and who are affiliated with organizations of the following types located in the United States:

- NASA installations, NASA contractors, or NASA grantees
- Other U.S. Government agencies, their contractors, or grantees
- Universities or colleges
- State or local governments
- Nonprofit organizations

These same services are available to similar types of organizations outside the United States through WDC-A-R&S.

Anyone who meets the criteria specified above and who wishes to obtain a copy of a document or to be placed on a mailing list to routinely receive a particular category of document should specify why the document is needed, the subject of the work, the name of the organization with which he is affiliated, and any Government contracts which require him to have access to this information. Individuals who do not meet the criteria specified above may obtain copies of documents at cost through:

National Technical Information Service
U.S. Department of Commerce
P.O. Box 1553
Springfield, Virginia 22151
U.S.A.

A user may obtain documents in any of the following ways:

1. Letter request
2. Document Request Form (included at the end of this document)
3. Telephone request
4. On-site request

Users who reside in the U.S. should direct requests for documents to:

National Space Science Data Center
Code 601.4
Goddard Space Flight Center
Greenbelt, Maryland 20771
Telephone: (301) 344-6695

Users who reside outside the U.S. should direct requests for documents to:

World Data Center A for Rockets and Satellites
Code 601
Goddard Space Flight Center
Greenbelt, Maryland 20771
U.S.A.
Telephone (301) 344-6695

When ordering individual documents, or when requesting to be placed on a mailing list for a particular document category, the user must provide the general information requested in the preceding paragraph on Availability. In addition, the user must identify each of the documents by order number and title as given in the attached list of documents. The Document Request Form at the end of this document is intended to serve as a convenient mechanism for users to order documents described herein. When orders are received for documents that have been superseded or supplemented by later issuances, the user will be provided with the latest issue including any supplements.

DOCUMENT CATEGORIES

Documents Describing the Operation of NSSDC and WDC-A-R&S

These documents, written on an unscheduled basis, contain general information about NSSDC and WDC-A-R&S, such as functions, operating procedures, sphere of activity, history, and services. These documents are available through standard ordering procedures.

Documents Describing the Availability of Satellite Experiment Data

These documents announce the availability of data at NSSDC/WDC-A-R&S and aid the user in the selection of data and in the use of selected data. These documents may take one of several forms: (1) Catalogs describe the data that are available at NSSDC/WDC-A-R&S in a particular discipline, (2) Data Announcement Bulletins inform the scientific community of data that have become available since the last applicable catalog was published, (3) Data Users Notes provide substantial specific information about the data obtained from an experiment and aid in the selection of data for study, and (4) The annual *NSSDC Data Listing* provides a convenient abbreviated reference to space science and supportive data available from NSSDC. In certain cases, the catalogs go beyond describing the experiments and data sets covered by including summaries of mission characteristics and objectives.

The types of satellite experiment data acquired by NSSDC have been divided into the following eight major categories: Astronomy, Geodesy and Gravimetry, Ionospheric Physics, Meteorology, Particles and Fields, Planetary Atmospheres, Planetology, and Solar Physics. The subdivision of data at NSSDC into these categories is part of the Selective Dissemination of Information (SDI) concept implemented in 1974. Users who wish to receive announcements relative to any of these categories should complete the order form included with this document. They will be placed on the appropriate distribution lists based on the categories selected.

The eight categories of satellite experiment data acquired by NSSDC are defined in the following paragraphs. It should be noted that these definitions reflect the best judgement of NSSDC scientists in light of the NSSDC data base and file structure, as well as anticipated use of data. They are not intended as definitive descriptions of discipline boundaries.

ASTRONOMY - This category includes all observations of astronomical objects, both outside and within the solar system, made at various wavelengths (i.e., gamma rays through radio waves). Observed objects outside the solar system include stars, nebulae, galaxies, and all other matter. Observed objects within the solar system include zodiacal light sources, meteoroids, asteroids, dust micrometeorites, and planetary radio emission sources. Other planetary observations (see Planetary Atmospheres, Planetology, or Ionospheric Physics) and solar observations (see Solar Physics) are excluded. Observations of cosmic-ray particles are listed under Particles and Fields. Celestial mechanics measurements are included under Geodesy and Gravimetery.

GEODESY AND GRAVIMETRY - This category includes experiments that measure size, shape, mass, coordinates, altitudes, or gravity fields; or experiments concerned

with the mapping of a body. It includes the mechanics of orbiting artificial and natural bodies.

IONOSPHERIC PHYSICS - This category includes observations of the ionosphere, which is defined as that region of a planetary atmosphere which contains a significant number of free thermal electrons on a daily basis and which has a free electron density maximum in the vertical direction. Its upper and lower extents are roughly defined as the areas in which densities approach 10^{-4} of the peak values. Included are all in situ and remotely sensed observations of ionospheric charged particles with thermal energies. This category is used for remotely sensed propagation experiments that primarily focus on the ionosphere, including very low frequency (VLF) and extremely low frequency (ELF) experiments; for other remotely sensed propagation experiments, an appropriate category, such as Particles and Fields, is used.

METEOROLOGY - This category includes observations made in the Earth's hydrosphere and atmosphere up to the mesopause or D region.

Meteorological data catalogs and users guides provide a comprehensive description of the acquisition, processing, and availability of data from experimental meteorological satellites.

The users guides, one for each spacecraft, provide potential data users with background information on the spacecraft and experiments as a basis for selecting, obtaining, and utilizing data in research studies. The basic spacecraft system operation and the objectives of the flight are outlined, followed by a detailed discussion of each of the experiments. The format, archiving, and access to the data are described. Finally, the contents and format of the data catalogs are also described. The users guide contains information that is current as of a few months prior to launch. Postlaunch information changes and corrections to the users guide are included in the data catalogs.

Usually, the data catalogs will provide detailed information on the type of data available, anomalies in the data, if any, and geographic location and time of the data. Photofacsimile reproductions of the data from infrared radiometer experiments are usually included in the data catalogs.

Users guides are issued at the approximate time of the spacecraft launch date. The first data catalog for a spacecraft is issued approximately 6 months after launch and subsequent volumes are issued at 2- to 3-month intervals. These documents are available through standard ordering procedures.

PARTICLES AND FIELDS - The subcategory Particles includes all in situ charged particle measurements except those of thermal plasma in terrestrial or other planetary ionospheres (see Ionospheric Physics). It includes all neutron measurements and electron densities (except those in which the most significant portion of the free electrons within the column is within an ionosphere). The subcategory Fields includes all in situ measurements of electric and magnetic fields. It includes VLF and ELF experiments other than those primarily concerned with observing ionospheric properties. It excludes electromagnetic radiation (radio waves through gamma waves) propagating away from remote sources. (In such cases, either Solar Physics or Astronomy is used, as appropriate.).

PLANETARY ATMOSPHERES - This category includes all observations of the gaseous envelope above the surface of a planet. For the earth the lower limit for observations that belong in this category is about 65 km, the height of the mesopause or D region. (For studies below this altitude, Meteorology is used.) The upper limit is defined as the transition level to the lightest gas. This region overlaps the ionosphere for planets which have an ionosphere; however, ionospheric observations are restricted to observations related to the charge aspects of matter, while the Planetary Atmospheres category relates to the mass aspects of matter (e.g., composition measurements). For cases in which both atmospheric and ionospheric categories apply, both may be used.

PLANETOLOGY - This category includes experiments for the purpose of deriving and analyzing data from the solid or liquid parts (excluding the oceans of the earth) of any solar system body. Chemical, physical, and geologic studies or properties of gross or small surface features, materials of the surface, internal properties, magnetic properties, etc., are included. Gravitational and geodetic experiments are excluded from this category (see Geodesy and Gravimetry). When the primary purpose of the study is to measure the residual effects of some external phenomena (such as meteorite or cosmic-ray impacts), the external phenomena should determine the choice of category. If necessary, the experiment may be assigned to more than one category.

Also included are Lunar and Planetary Catalogs and Users Guides, which announce the availability of lunar and planetary pictorial data and aid investigators in the selection of photographs for study. Included in the documents are brief descriptions of the mission objectives, photographic equipment, and photographic coverage and quality. Comprehensive descriptions of the photographic and supporting data are included. Index maps depicting the photographic coverage from each mission and proofprint picture catalogs are often included as part of the photography package. These documents are published as needed and are available through standard ordering procedures. Selected lunar and planetary maps in print are available through NSSDC/WDC-A-R&S. Information on the cost and availability of these maps can be obtained by contacting NSSDC.

SOLAR PHYSICS - This category includes all solar observations regardless of the wavelength being observed. The source region considered here extends outward from the sun to include that area observed with solar coronagraphs (nominally to 10 solar radii). All in situ measurements of electric or magnetic fields and of particles for which the source is believed to be the sun are considered to fall in the domain of Particles and Fields.

Updates are generated when warranted. These documents are available through standard ordering procedures.

Report on Active and Planned Spacecraft and Experiments

This annual report provides information on space measurements currently being made or those being planned in a broad range of scientific disciplines. By providing descriptions of the spacecraft and experiments, as well as approximate time periods when data are being accumulated, it is hoped that this document will be useful to people interested in the scientific, applied, and operational uses of such data. Furthermore, for persons planning or coordinating observational programs employing different techniques such as rockets, balloons, airplanes, ships,

and buoys, this document can provide insight into contributions that may be provided by orbiting instruments.

The report contains summaries of spacecraft and experiments investigating astronomy, earth sciences, meteorology, planetary sciences, geodesy and gravimetry, aeronomy, particles and fields, solar physics, life sciences, and material sciences.

Specifically not included in the report are navigational and communications satellites or passive satellites still actively tracked by optical or laser methods for geodetic or atmospheric drag studies, spacecraft having only continuous radio beacons used for ionospheric studies, classified spacecraft or experiments, and certain planned spacecraft or continuing series for which no information except the names is known. Updates are usually made annually, and are available through standard ordering procedures.

Handbook of Correlative Data

This document informs scientists of the availability of data potentially useful as correlative data in space science studies. The handbook acquaints the user with many solar geophysical phenomena and points the reader to more detailed discussions of the phenomena. It describes the nonsatellite data available from NSSDC and other facilities.

The handbook contains six major discipline-oriented parts covering galactic cosmic rays, solar electromagnetic radiation, energetic solar protons, geomagnetism, the ionosphere, and the neutral atmosphere. A miscellaneous data section covers magnetospherically trapped particles, solar wind, airglow, aurora, calendar records, activity charts, and Jovian radio emission. Each section includes a brief description of the phenomenon, reference to more extensive discussions of the phenomenon, reference to a discussion of measurement techniques, a brief discussion of available data, the time periods for which data exist, the medium in which data are stored, sources of more extensive data availability listings, and sources from which the actual data can be obtained. It should be noted that this handbook is rather dated, and there are no current plans to update it. However, more recent data are available through the National Geophysical and Solar-Terrestrial Data Center and the World Data Center A for Solar-Terrestrial Physics, both located in Boulder, Colorado.

Spacecraft Program Bibliographies and Summaries

The bibliographies serve as a consolidated reference source for information on specific spacecraft programs such as the Orbiting Geophysical Observatory (OGO) and the Interplanetary Monitoring Platform (IMP) series.

The bibliographies include information pertinent to major accomplishments of the program, descriptions of the spacecraft (physical characteristics, orbit parameters etc.) and spacecraft experiments, and references to the published scientific and technical papers, articles, and other documents covering instrumentation experiment results, spacecraft missions, etc. Copies of articles and reports referenced in the bibliographies are available at many scientific and technical libraries. If not, they can be obtained from the author or ordered through document distribution centers such as NASA's Scientific and Technical Information Facility (STIF), National Technical Information Service (NTIS), and the American Institute

for Aeronautics and Astronautics (AIAA). Document accession numbers are given in the bibliographic descriptions, when available, to aid in obtaining copies from the appropriate document distribution centers. Program summaries contain similar bibliographic information but also contain descriptions of the major scientific contributions made by analyzing data collected during the spacecraft program.

Supplements to the bibliographies and summaries or new cumulative editions are compiled as needed. These documents are available through standard ordering procedures.

Report on Models of the Near-Earth Environment

Models and data composites of the particle and field environments of near-earth space have been constructed at NSSDC since the middle 1960's. These include models of the geomagnetically trapped energetic charged particles, magnetic field models, and solar proton event models.

The recent proton and electron models provide particle flux above several energies as functions of B and L. These models have been documented in a series of NSSDC documents issued since 1972. Besides describing the models and their derivation, these documents describe how the models can be incorporated in a machine-sensible way to allow the user to calculate the flux that can be expected to be encountered on a given space mission. They also describe the data used in the development of the models and some restrictions or limitations with which the user should be familiar. They are intended to provide an understanding of the models and their uses to all users, from those interested in scientific uses, and the comparison of the data used in the models, to those interested only in the engineering applications.

Models have been developed for use in predicting particle fluences in the near-earth environment produced by solar storms. These are statistical models that allow one to estimate the probability that a specified fluence will be exceeded in a mission of given duration. A model to include geomagnetic shielding has been produced. A computer code to evaluate these model probabilities has been developed.

Models of the magnetic field in the vicinity of the earth have been generated and put into machine-sensible forms. Both internally and externally produced fields have been modeled. The internal fields have been modeled largely through Legendre polynomial expansions. External fields have taken both empirical and semi-empirical forms.

Data composites of the interplanetary medium have been prepared. These represent data-based averages, usually hourly averages, of the interplanetary magnetic field and plasma observations.

World Data Center A for Rockets and Satellites (WDC-A-R&S) Launch Summaries

These documents are a summary of satellite and rocket launching information received by WDC-A-R&S. These documents replace the WDC-A-R&S Catalogues of Data, which contained the same kinds of information, and the Sounding Rocket Launching Reports (SRL), which are no longer published. The launch summaries are divided into two parts:

- SOUNDING ROCKETS - This part contains a summary listing of successful scientific sounding rocket launchings identified during the report period and a listing of the names and addresses of scientists and institutions conducting scientific experiments using these sounding rockets. The listing of sounding rocket launchings presents information such as launch date and time, agency rocket designation, sponsoring country, launch site, experiment discipline, apogee, and principal experimenter. Also included in this part of the summary is information concerning the availability of meteorological sounding rocket data and a table of rocket launch sites giving the site name and location in geographic and geomagnetic coordinates.

- ARTIFICIAL EARTH SATELLITES AND SPACE PROBES - This part contains a summary listing of spacecraft successfully launched during the report period. The listing is chronologically ordered by spacecraft launch date. The spacecraft popular name, its official Committee for Space Research (COSPAR) international designation, the spacecraft sponsoring country, the launch date, and the initial spacecraft orbit parameters (epoch date, apoapsis, periapsis, period, and inclination) are included for each spacecraft listed.

Launch summaries are usually prepared once a year. Cumulative launch summaries are published every 5 years.

SPACEWARN Bulletin

The SPACEWARN system is an international mechanism for the rapid distribution of information on satellites (spacecraft) and space probes. This system is managed for COSPAR by the International Ursigram and World Days Service (IUWDS), a permanent service of the Union Radio Scientifique International (URSI) in association with the International Astronomical Union (IAU), the International Union of Geodesy and Geophysics (IUGG), and with close liaison with other International Council of Scientific Unions (ICSU) bodies. The IUWDS World Warning Agency for Satellites, which is operated by WDC-A-R&S, provides, on behalf of COSPAR, the international designation for each launching of spacecraft or space probe and issues the *SPACEWARN Bulletin*.

These bulletins serve as one mechanism for the distribution of satellite and space probe information. The material they contain is consistent with the *COSPAR Guide to Rocket and Satellite Information and Data Exchange* and various COSPAR resolutions; additional details may be found in the *COSPAR Information Bulletin* and other COSPAR reports.

The *SPACEWARN Bulletin* consists of the following four sections:

- A list of recent spacecraft launchings identifying their official international designations

- Texts of satellite and space probe launch announcements received by IUWDS World Warning Agency for Satellites during the previous month, identifying spacecraft name, launch date and time, initial orbit characteristics, and a statement of the mission objectives

- Listings of spacecraft particularly suited for international participation such as: (1) spacecraft with essentially continuous radio beacons on frequencies less than 150 MHz, or higher frequencies if especially suited for ionospheric or geodetic studies; (2) spacecraft that provide telemetered information on a continuing basis; (3) optical objects used for geophysical studies; and (4) satellites useful for simultaneous observation programs with small cameras

- Launching reports, as available, including prelaunch and postlaunch information pertaining to project and experiment officials, spacecraft and experiment mission objectives and instrumentation, spacecraft configuration, etc.

The *SPACEWARN Bulletin* is published monthly. It is issued to COSPAR National Contacts for satellite information, Satellite Regional Warning Centers, and various leaders and participants in COSPAR activities. Individuals can be added to the mailing list only with concurrence from their National SPACEWARN Representative. For further information, write to the following address:

IUWDS World Warning Agency for Satellites
Code 601
Goddard Space Flight Center
Greenbelt, Maryland 20771
U.S.A.

The International Magnetospheric Study/Satellite Situation Center (IMS/SSC)

The International Magnetospheric Study (IMS) was a concerted effort by nearly 50 countries to acquire and study ground-based, balloon, rocket, aircraft, and satellite data needed to improve our understanding of the plasma environment of the earth. An intensive data acquisition phase of the IMS was conducted from 1976 through 1979 and is being followed by a data analysis phase planned for the period 1980 through 1985.

The IMS/Satellite Situation Center (SSC) was operated by NSSDC/WDC-A-R&S, and produced periodic reports that provided concise and easily used descriptions of the orbital positions of a number of satellites capable of making magnetospheric measurements during special periods. Also available is the *IMS Directory of Spacecraft and Experiment Scientific Contacts* which contains a Spacecraft Section and an Experimenter/Scientific Contacts Section.

Although the data acquisition phase of the IMS is over, some services of the IMS/SSC continue under the name of the Satellite Situation Center. These services include the prediction of various multi-satellite configurations in the magnetosphere and in the interplanetary medium. Details of these services may be obtained from NSSDC/WDC-A-R&S.

The Data Analysis Workshop Center

The Data Analysis Workshop Center (DAWOC) was developed to support the data analysis phase of the IMS, but it is also providing support to other areas of space science. This center conducts a series of Coordinated Data Analysis Workshops (CDAW) in which computer-accessible data bases play a central role. The operational philosophy and the experience gained from the first workshop (CDAW 1.0)

are described in *An Evolutionary Approach to the Group Analysis of Global Geophysical Data*.

Each data base is built around a specific problem using ground-based and satellite data supplied by various investigators. Accompanying each problem-oriented data base is a Data Catalog describing the data sets, parameters, and other supporting information. As successive workshops are held on a given problem, the corresponding data base and Data Catalog are updated. Currently, four Data Catalogs are available for CDAWs 1.0, 2.1, 3.0, and 4.0. Additional Data Catalogs will become available as new data bases are generated.

Astronomical Data Center

The Astronomical Data Center collects, creates and maintains catalogs of astronomy-related data for the purpose of disseminating requested material to the astronomical community. Through a cooperative agreement with the Centre de Données Stellaires in Strasbourg, France, all catalogs received by each institution are supplied to the other so that both locations have complete libraries. Data are also exchanged with astronomical data centers in Japan and the USSR. The Astronomical Data Center publishes an intermittent bulletin containing progress reports on astronomical data-related topics, plus a status report on catalogs currently available.